Space Weather Forecast

Issued on Sunday 22 December 2024 at 13:21 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate radio blackouts likely. Uncertainty in geomagnetic forecast.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate due to a single impulsive low level Moderate-class flare at 22/0410 UTC from a moderately large region in the southeast.

There are currently eleven sunspot regions on the visible disc. The southeastern quadrant remains the focus of main solar activity, containing a cluster of the three largest regions, all of which are moderately wide bipolar spot groups, showing some degree of magnetic complexity. A region in the southwest has recently seen a small opposite polarity spot develop, and is now a simple bipolar group. A region in the far northeast is also appearing to be a fairly wide spot group as it rotates more into view. Other remaining regions are relatively small, stable and magnetically simple.

A filament (arc of plasma) lift-off from the northeast and associated Coronal Mass Ejection (CME) from late in the UTC day on 20 Dec was modelled and gives a potential peripheral glance around 24/0000 UTC.

A number of other CMEs have been observed in available imagery during the period. Analysis of these suggests none have an Earth directed component, however confidence in the complex number of CMEs is currently low.

Solar Wind / Geomagnetic Activity: Solar winds have shown elevated conditions with uncertain cause - perhaps connection to a central 'coronal hole' in the southwestern quadrant. The solar wind speeds have averaged around 530 km/s, staying Elevated throughout the period. The associated magnetic field was moderate at times, with an erratic but weak north-south component. Geomagnetic activity was Quiet to Unsettled (Kp2-3).

Energetic Particles / Solar Radiation: High energy proton flux gradually increased early in the period before levelling off, remaining sub-Minor Solar radiation storm level.

Four-Day Space Weather Forecast Summary

Solar Activity: Isolated Moderate-class flares are likely, mainly from the regions in the southeast quadrant, and perhaps bolstered slightly beyond the current UTC weekend by returning regions. A

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slight chance of isolated Strong-class flares is maintained throughout.

Solar Wind / Geomagnetic Activity:

A filament lift-off from the northeast from late in the UTC day on 20 Dec was modelled and gives a potential peripheral glance around 24/0000 UTC. No other Earth-directed CMEs appear in the forecast, however the number of CMEs over the past few days means confidence is low.

Overall, conditions are likely to remain Quiet to Unsettled. Given current Elevated solar wind speeds, there is a chance of Active conditions through the period, tentatively peaking around days 2 and 3 (23-24 Dec) due to coronal hole influence and possible glancing influence from 20 Dec CME, with a slight chance of G1 Minor Geomagnetic Storms.

Energetic Particles / Solar Radiation: There is a slight chance of Solar Radiation storms through current UTC weekend due to current slightly enhanced near-Earth proton counts. This risk should relax back in the absence of any significant flares, with most of the risk from the front-side then tied to the westward advance of the cluster of southeastern sunspot regions.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	10	20	5
Strong	G3	No	1	1	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	65	70	75	75
Very Active	R3-R5 (X Class)	No	10	10	10	10

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	20	15	20	20
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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